A Note on the Welfare Gain from Stable Inflation in the Years of Great Moderation

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【概要】

This note estimates the welfare gain from stable inflation accrued in Germany, Japan and the United States in the years of the Great Moderation (1985－2006). The estimates range from almost nil in Germany to about 0.01% of income in Japan and 0.03% in the United States.

【キーワード】

inflation, welfare cost, the Great Moderation

1. Introduction

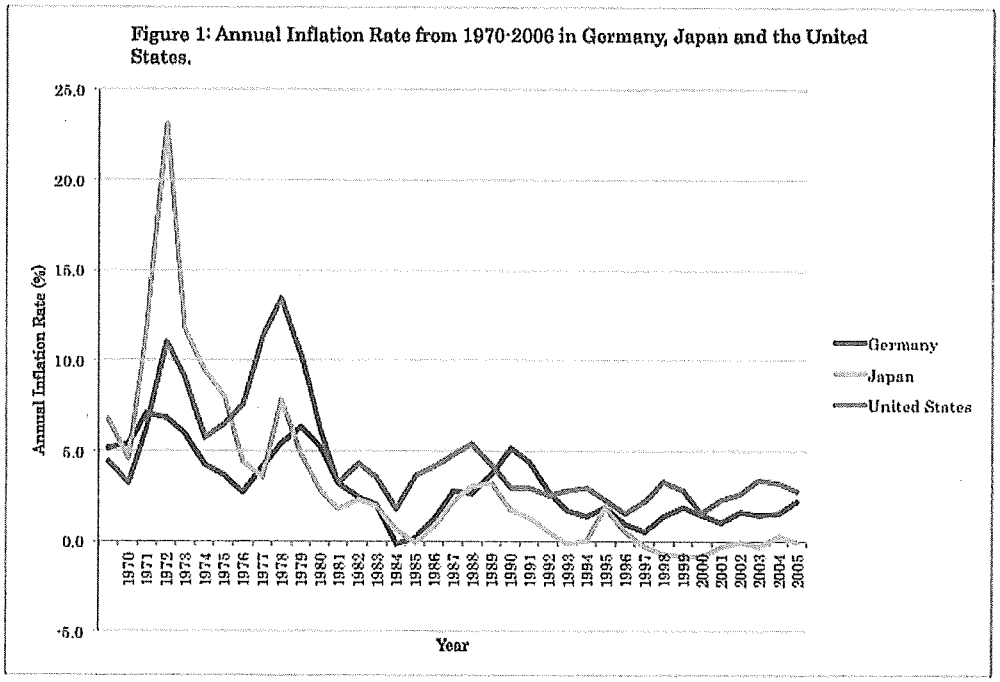
In the 1980 s, the variability of business cycle began to decline in advanced economies, and had stayed low until the 2007－8 financial crisis. Kim and Nelson (1999) and McConnell and Perez－Quiros (2000) documented that the volatility of the U.S. real GDP growth, measured in standard deviation, declined in the early 1980 s. Stock and Watson (2001) pointed out that a wide variety of economic variables, such as output, consumption, employment and inflation, moderated in volatility; they called this phenomenon the Great Moderation. The Great Moderation was also observed in other advanced economies (Bernanke (2004)).

This note focuses on one aspect of welfare gains accrued in the years of Great Moderation: a welfare gain from stable inflation. Risk－averse individuals generally gain from stable economic variables, and the advanced economies gained from stable inflation created by the Great Moderation. Figure 1 plots annual inflation rates in Germany, Japan and the United States from 1970 to 2006. Comparing the Great Moderation (1985－2006) and the Great Inflation (1970－1980), standard deviations of the inflation rate declined by about 10% (Germany) to 80% (Japan) in these economies.

In what follows, we estimate how much welfare gain was accrued in transition from the Great Inflation to the Great Moderation.

2. A Model and Estimates

The money demand function is assumed to be a function of the nominal interest rate and real income:



$$M = f(i, Y)$$

where M is the real money demand, i is the nominal interest rate, and Y is real income. This can be derived from general equilibrium models with a utility-maximizing representative agent (see chapters 2 and 3 of Walsh (2010)). We expand this up to the second order with respect to i around a mean of the nominal interest rate i^* :

$$M = f(i^*, Y) + f'(i^*, Y)(i - i^*) + \frac{1}{2} f''(i^*, Y)(i - i^*)^2$$

Taking expectations yields

$$E[M] = f(i^*, Y) + \frac{1}{2} f''(i^*, Y)\,\mathrm{Var}(i)$$

Note $f''(i^*, Y) > 0$, which implies that under unstable inflation, individuals are incentivized to hold more money than they would under stable inflation.

Inflation being considered as a tax, the excess burden imposed under unstable inflation is

$$\frac{1}{2}\pi f''(i^*, Y)\,[\mathrm{Var}(i)_{\text{unstable}} - \mathrm{Var}(i)_{\text{stable}}]$$

where π is the rate of inflation, $\mathrm{Var}(i)_{\text{unstable}}$ and $\mathrm{Var}(i)_{\text{stable}}$ are variances of the nominal interest rate under unstable and stable inflation. This excess burden is also interpreted as the welfare gain in transition from unstable to stable inflation.

With the semi-log money demand function $M = \alpha e^{-\beta i} Y$, the welfare gain is

$$\frac{1}{2}\pi\alpha\beta^2 e^{-\beta i^*} Y\,[\mathrm{Var}(i)_{\text{unstable}} - \mathrm{Var}(i)_{\text{stable}}]$$

We parameterize this formula and estimate the welfare gain accrued under the Great Moderation. Table 1 shows means and standard deviations of the inflation rate in Germany, Japan and the United States. We also use parametric values from Cagan (1956) and Sachs and Larrian (1993) for the semi-log function (α = 1/3 to 1/2, β = 7.4 to 20), and assume the real interest rate is constant at 2% so that Var(i) is replaced by Var(π) (the Fisher relation). From these figures, we calculate estimates of the welfare gain, as a fraction of real income per year, from stable inflation in the years of the Great Moderation. The estimates are summarized on Table 2.

Table 1 : Summary Statistics of Inflation Rate for Germany,Japan and the United States

		Germany	japan	United States
Great Inflation (1970-1980)	mean	5.2	8.7	8.1
	standard deviation	1.4	5.6	3.2
Great Moderation (1985-2006)	mean	1.9	0.6	3.0
	standard deviation	1.3	1.2	1.0

3. Concluding Remarks

The Great Moderation created a stable economic environment in the advanced economies. In this note, we estimate how much the welfare gain from stable inflation was accrued to them in those years. The estimates range from almost nil in Germany to about 0.01% in Japan and 0.03% in the United States.

The limitations of our estimation should be borne in mind. Lower levels of inflation observed in the years of the Great Moderation also reduced the cost of holding money ; we put this to one side in our estimation. Moreover, we implicitly assume that inflation is fully anticipated ; the effect of more forecastable inflation under the Great Moderation may have lead to less confusion of absolute and relative prices.

Table 2 : Welfare Gain from the Great Moderation

Germany

		α		
		7.4	15	20
β	1/3	0.0008	0.0000	0.0000
	1/2	0.0000	0.0000	0.0000

Japan

		α		
		7.4	15	20
β	1/3	0.01076	0.00002	0.00000
	1/2	0.00004	0.00000	0.00000

United States

		α		
		7.4	15	20
β	1/3	0.0267	0.0004	0.0000
	1/2	0.0002	0.0000	0.0000

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